CLAIMS

What is claimed is:

1. A method of creating a master library of grating profiles, the method comprising:

5   specifying a parameter set including a plurality of dimensions of a grating; and

compiling a master library of profiles, the profiles including data representing combinations of grating dimensions in the specified parameter set and corresponding calculated spectrum data.

10   2. The master library profile creation method of Claim 1, wherein the parameter set including the plurality of dimensions of the grating comprises a minimum value, a maximum value, and a resolution for a dimension of the plurality of dimensions of the grating.

15   3. The master library profile creation method of Claim 2, wherein the plurality of dimensions of the grating comprises a grating top critical dimension, a grating bottom critical dimension, a grating thickness, and an underlying thickness.

4. The master library profile creation method of Claim 3, wherein the plurality of
20 dimensions of the grating further comprises a percent height at inflection point and a grating width at inflection point.

5. The master library profile creation method of Claim 1, further comprising storing the master library of grating profiles in a storage medium.

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6. The master library profile creation method of Claim 5, wherein the storage medium for the master library of grating profiles comprises a CD-ROM, a magnetic tape, a magnetic disk, and a file available for network use.

7. The master library profile creation method of Claim 6, wherein the master library of grating profiles available for network use is transmitted to clients or downloaded by clients.

8. A system for creating a master library of grating profiles comprising:

a storage medium for storing the master library of grating profiles; and

a computer coupled to the storage medium; and

a compiler operable in the computer, for creating the master library of grating profiles;

wherein the computer activates the compiler to create the master library, the compiler prompting specification of a parameter set of grating dimensions, the compiler validating the specified parameter set, the compiler creating the master library of grating profiles, based on the validated parameter set, and corresponding calculated spectrum data, and the compiler storing the master library of grating profiles in the storage medium.

9. The master library profile creation system of Claim 8, wherein the computer is a server farm.

10. The master library profile creation system of Claim 8 further comprising an input device, coupled to the computer, for entering the parameter set of grating dimensions for the master library of grating profiles.

11. The master library profile creation system of Claim 8, wherein the storage medium for storing the master library of grating profiles comprises a CD-ROM, a magnetic tape, a magnetic disk, and a file available for network use.

12. The master library profile creation system of Claim 11, wherein the file available for network use is transmitted to clients or downloaded to clients.

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13. The master library profile creation system of Claim 12, wherein the file of grating profiles comprises a database of grating profiles and a run-time compiler.

14. A system for creating a run-time library of grating profiles comprising:

a master library of grating profiles;

a storage medium for storing the run-time library;

a computer coupled to the master library and the storage medium; and

a run-time compiler operable in the computer, for generating a run-time library of grating profiles;

wherein the computer activates the run-time compiler to generate the run-time library, the compiler prompting for specification of the selection parameter set, the compiler validating the specified selection parameter set, the compiler extracting the profiles from the master library of grating profiles, the compiler creating the run-time library of grating profiles, and the compiler storing the run-time library in the storage medium.

15. The run-time library creation system of Claim 14, wherein the specified selection parameter set comprises a specified minimum value, a specified maximum value, and a specified resolution value of the grating dimensions.

16. The run-time library creation system of Claim 15, wherein validation of the specified selection parameter set comprises checking that the specified minimum value and specified maximum value of the grating dimension are within the minimum value and maximum value of the corresponding dimension in the master library, and that the specified resolution value of the grating dimension is the same or higher than the resolution value for the master library for the corresponding dimension in the master library, and that the specified resolution value for the dimension is a multiple of the resolution value of the master library for the corresponding dimension in the master library.

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17. The run-time library creation system of Claim 14 further comprising an input device, coupled to the computer, for specifying the selection parameter set for the run-time library.

18. The run-time library creation system of Claim 14, wherein the storage medium for storing the run-time library of grating profiles comprises a CD-ROM, a magnetic tape, a magnetic disk, and a file available for network use.

19. The run-time library creation system of Claim 14, wherein the run-time library comprises a database of grating profiles and a file containing a process average of each dimension of the grating.

20. A database format for storing grating profiles, the database format comprising:

a grating top critical dimension;

a grating bottom critical dimension;

a grating thickness; and

calculated spectrum data.

21. The database format of Claim 20, wherein the grating top critical dimension, grating bottom critical dimension, and grating thickness are expressed in nano meters.

22. A display format of grating profiles, the display format comprising:

a grating top critical dimension;

a grating bottom critical dimension;

a grating thickness; and

calculated spectrum data.

23. A method for evaluating grating spectrum data, the method comprising:

comparing a grating spectrum data to ranges of grating calculated spectrum data in a run-time library;

flagging the grating spectrum data as falling within the calculated spectrum data ranges in the run-time library or flagging the grating spectrum data as falling outside the calculated spectrum data ranges in the run-time library; and

selecting the profile instance in the run-time library whose calculated spectrum data is closest to the grating spectrum data.

24. The grating spectrum data evaluation method of Claim 23 further comprising recording the selected the profile instance in the run-time library whose calculated spectrum data is closest to the grating spectrum data.

25. A system for evaluating grating profile data comprising:

a spectroscopic optical metrology device for generating grating spectrum data;

a run-time library of grating profiles; and

an profiler application server coupled to the spectroscopic optical metrology device and the run-time library, for comparing the grating spectrum data to instances of calculated spectrum data in the run-time library and for selecting the profile instance in the run-time library whose calculated spectrum data is closest to the grating spectrum data;

wherein the spectroscopic optical metrology device communicates the grating spectrum data to the profiler application server; the profiler application server accesses the run-time library; flags the grating spectrum data if the grating spectrum data is outside the ranges of the calculated spectrum data in the run-time library or flags the grating spectrum data if the grating spectrum data is within the ranges of the calculated spectrum data in the run-time library and selects the profile instance in the run-time library whose calculated spectrum data is closest to the grating spectrum data.

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26. A method of automatically compiling a replacement run-time library of grating profiles, the method comprising:

specifying a set of trigger conditions that causes compilation of a replacement run-time library of grating profiles; and

5   compiling the new run-time library of grating profiles whenever the set of trigger conditions is met.

27. The automatic compilation of a replacement run-time library method of Claim 26, wherein the set of trigger conditions comprises one or more process averages of

10   parameter-dimensions exceeding corresponding predetermined amounts or percentages.

28. The automatic compilation of a replacement run-time library method of Claim 26, wherein the set of trigger conditions is evaluated after a specified length of time has elapsed or after a predetermined number of gratings is manufactured.

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29. A system for automatically compiling a replacement run-time library of grating profiles, the system comprising:

a master library of grating profiles;

a starting run-time library of grating profiles compiled with a starting set of trigger

20   conditions causing compilation of a profile library;

a replacement run-time library of grating profiles, for replacing the starting run-time library of grating profiles when compiled;

a run-time compiler for compiling the replacement run-time library of grating profiles;

25   a computer coupled to the master library and the starting run-time library; and

a comparator operable in the computer, for calculating actual process values and comparing the calculated actual process values to the starting set of trigger conditions;

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wherein the comparator, detecting a condition where the calculated actual process values meet the requirements of the starting set of trigger conditions, invokes the run-time compiler to compile the replacement run-time library of grating profiles.

30. The automatic run-time library compilation system of Claim 29, wherein the starting set of trigger conditions is evaluated after a specified length of time has elapsed or after a predetermined number of gratings is manufactured.

31. A system for generating a library of grating profiles comprising:

a parameter set for specifying a type of library of profiles and for specifying ranges and resolutions of dimensions of gratings;

a computer; and

a library generator, operable in the computer, for compiling a plurality of libraries of profiles, the profiles including data representing combinations of grating dimensions in the specified parameter set and corresponding calculated spectrum data;

wherein the library generator creates a master library of profiles when the type of library specified by the parameter set is for the master library and creates a run-time library of profiles when the type of library specified by the parameter set is for the run-time library.

32. A method of providing a service for generating a library of grating profiles, the method comprising:

contracting by a client and a vendor, for the client to remunerate the vendor for the use of the systems, processes, and procedures to generate a library of grating profiles; or for the delivery of libraries of grating profiles to the client; and in return for the remuneration from the client, for the vendor to provide access to the systems, processes, and procedures for generating the library of grating profiles for the client or for the vendor to generate and deliver a library of grating profiles to the client;

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providing by the vendor to the client access to the systems, processes, and procedures to generate the library of grating profiles; and

using by the client or by the assignees, beneficiaries, or licensees of the client the systems, processes, and procedures to generate the library of grating profiles.

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33. A computer storage medium storing the computer readable code for causing a computer system to execute the steps of generating a library of grating profiles, the steps comprising:

specifying a parameter set for a type of library of grating profiles ; and

10   compiling the type of library of grating profiles corresponding to the specified parameter set, wherein the profiles include data representing combinations of grating dimensions in the specified parameter set and corresponding calculated spectrum data.

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